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Alexander, James

A five farthing penny

Edinburgh

[1864?]

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FIVE FARTHING PENNY

A NEW AND SIMPLE SYSTEM OF
ACCOUNT AND RECKONING

FOR

THE MILLION

BY

JAMES ALEXANDER

*Read before the Royal Society of Edinburgh,
21st March 1864*

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PREFACE.

—
"It pleased not the million :
Some said, there were no sallets in the lines
To make the matter savoury."—SHAKESPEARE.

THE author of this paper is induced to publish it, in the hope of exciting an interest in coinage decimals among classes of the people who have hitherto been utterly apathetic and dormant on the subject. Yet, it is emphatically "a people's question;" and, as such, it is treated in the following pages. It is now to be hoped, that, instead of the discussion of the general question being left, as hitherto, to Bankers, Insurance Actuaries, Merchants' Companies, and Chambers of Commerce, it may form a subject of investigation and debate to Mechanics' Institutes and kindred institutions pervading the great masses of the people. All schemes hitherto proposed, have offered to the people only what are called "great moral advantages," and some of them at the sacrifice of the material. A distinctive feature of the present scheme, however, is, that it combines with, or adds to, the "moral," material advantage of no little weight, particularly in rendering possible, by the introduction of a lower and hitherto *disused* coin, the statutory regulation of the price of the loaf of bread. The Chancellor of the Exchequer has said that—discuss and suggest upon the question of a decimal coinage as the *upper* mercantile classes may—"a certain preparedness in the public mind throughout the country, is an indis-

pensable preliminary to any serious measure on the part of the Government—that the existing differences of opinion are wide, and much more of discussion is required, to effect that approximation of sentiment and that general ripeness of view, without which, it would not be safe for Government to cut the knot of controversy, by determining upon the practical form in which the change might be made.” The settlement of the long pending question, then, appears to rest upon the interest manifested in it by the intelligent masses of the people; and in introducing a new scheme, the author would respectfully commend it, and the subject generally, to their attention.

The Author was induced, latterly, to take up the study of this subject in the Parliamentary Blue Books, to relieve the tedium of forced inaction from physical infirmity, and without any expectation of being able to eliminate so simple a solution as he now presents. Whether it be received with general acceptance or not, he is at least constrained to feel, that his personal affliction in loss of health, is not only mitigated, but has been overruled for good, in the inscrutable purposes of that Allwise Disposer, in whose hand are the health as well as the lives of all men.

The author is further induced, *forthwith*, to publish this easy formula for decimal money reckoning, as a knowledge of it, in its simplicity, and of Table No. 1, Appendix, may materially aid the intelligent and provident working classes in entering into the merits, and appreciating the advantages, of the comprehensive and benevolent scheme of Life Assurance and annuities, which is being even now placed before the country by the Chancellor of the Exchequer.

THE

DECIMAL PROBLEM SOLVED.

THE decimalization of coinage and accounting has for centuries formed an object of desire and research in this country. From its being yet unattained to, while most of the nations of the surrounding world have effected it, Great Britain finds herself, as it were, isolated in parity of monetary reckoning, and her people, from the earliest pupillage to the grave, are, in consequence, subjected to an unnecessary amount of intellectual “labour and sorrow.” Since the close of the first quarter of this century (1824), when the subject was prominently brought before Parliament, no advance has been made, beyond the coinage (in 1847) of a two-shilling piece, or “florin,” which is now declared to have been a great mistake. Not that a two-shilling piece is not a convenient coin, but, as “the tenth of a pound,” which it bears to be, it has had the effect of wedding a large, intelligent, but withal too persistent party, to a definite course of action, in pursuance of which, they will scarcely listen to any competing scheme, although, as I shall shew, they overlook and disregard laws which are immutable, and not to be strained. Every one who has either spoken or written on the question, during the last thirty years, has unhesitatingly admitted, that if decimalization could be achieved, “without inconvenience,” it would be an inestimable boon to the country. But the motto of every Government, in respect of this question, has been “*Festina lente*,” while an influential party has arisen, who are rather disposed to dogmatize upon a particular scheme. The position will be best understood from the following extracts. On 5th April 1853, Mr. Gladstone

said in the House, "That the Government were fully sensible of the great importance of the question of decimal coinage, and they likewise felt, that the utmost attention was due to the arguments and opinions of those who had recommended the change; but the Government were also of opinion, that the matter was one of great importance, and of great delicacy as well as importance, and that the altering the value of those particular coins which were, in point of fact, the measures of value, and the basis of the whole ideas of value, of the mass of the people, was a very serious matter indeed, and one which ought not to be undertaken, on any mere abstract opinions and considerations, without fully ascertaining that the ground under foot was secure." After the report of the Select Committee then appointed, recommending what is now known as "the pound and mil scheme," Sir William Brown, the president of the then newly-inaugurated Decimal Association, writes the Chancellor of Exchequer as follows:—"Surely it is sufficient that *those best qualified to judge*, and who have examined every other proposal, are all but unanimously agreed, that the pound is the unit coin of account best suited to our circumstances; the pound being established, the florin, which was issued expressly for the purpose, and is already in the hands of the public, falls into place as the next coin of account, and for which purpose it is already marked 'the tenth of a pound;' and to complete the number, there is wanted but the coinage of a silver tenth of a florin, and a copper tenth of the new silver coin."

The Government still exhibiting hesitation, the Royal Commission of 1856 was appointed, to inquire still farther, with Lord Monteaigle (and, on his resignation, Lord Overstone) as chairman. Here the Decimal Association had a fair field for the promotion of their views; but after fully sifting the question, the Royal Commissioners reported to Her Majesty that "it was impossible to introduce decimals, without sacrificing either the pound or the penny;" and that "the particular form of decimal coinage proposed as the pound and mil scheme, cannot be looked upon as a well-assured and demonstrated improvement on our present coinage; but must

rather be considered as an experiment of very doubtful result, accompanied beyond all question by many serious transitional difficulties;" and "that, as regards the comparative convenience of the coins provided by the rival systems, the advantage appears to rest with our present coinage." Thus, then, have the promoters of a decimal coinage been for thirty years working in a circle; trying by one proposition after another to square it, at almost every point of the circumference, but trying in vain. It has long appeared to me, that it is the almost absolute perfection of our coinage as a monetary system (always excepting the mere absence of the decimal principle), which renders the introduction of that principle *apparently* so difficult. I say apparently, for I hope to shew you that it is really the easiest matter, when it is revealed; and that it has not been so long ago is a marvel. I would humbly suggest, that of all the eminent men who have dealt with the question, few if any of them, in attempting to apply decimals to our *existing* tangible coinage, have desisted the operation of the peculiar and immutable laws which govern decimal reckoning, and which come into operation, in the division of a coinage, as certainly as in the most extended field of research. Had our attempted appropriation of decimals been a passage from more or less of chaos and confusion in the coinage, to ease and simplicity, we would only have had to do—as other nations now enjoying decimals have done—set down four units (1111); call the first, as in America, a dollar (or any other name); the second a dime; the third a cent; and the fourth a mil. Establish coins under such names, and the halves and quarters of the first three; the last division—the $\frac{1}{1000}$ of a low unit—is too minute for use as a coin, and in America has disappeared, as the reaf of Portugal appears to have done centuries before.

Every arithmetician knows, that in decimals there is a limit—a decree of "hitherto shalt thou come and no further," which is always meeting him, by the decimal either "terminating or repeating." Lord Overstone does not seem to have desisted, that, in evolving a *new series* of coins, decimalizing nations have really had no choice but the *unit* of a thousand

for their maximum, or he would not have expressed himself thus dubiously. "Another distinction, which it is essential to bear in mind, in order rightly to estimate the weight of the experience of other countries, is this—that without any exception, the various decimal coinages, established in different parts of the world, have their maximum unit much smaller than the pound sterling, and comprise only 100 steps between the highest and lowest units in actual use. This universal preference for a centesimal over a millesimal division would not indeed militate against some of the schemes which have been proposed to us." Now, what Lord Overstone speaks of as 100 "steps," is, decimally, only *two steps* from unity, as a millesimal division is three steps, through a centesimal or millesimal *range*; and lower it is impossible to go. The decimalizers of the pound again, working with "concrete coins," have not desecrated the termination of the decimal, while only half-way through the desired range. To divide unity in the pound, already existent as a *definite unit*, they have practically—whether by multiplication or division I know not—first made it twenty shillings, and the very first division by 10 cuts off the cipher, and they are left alone with the *duo*, a tolerably significant hint that it is in *duodecimals*, and not in decimals, that the remedy is to be found. At all events, it is undeniable that their line of division "terminates;" and to project a new line from the terminus, involving *vulgar* fractions, is against all the rules of decimal engineering. In studying the Blue Books issued by the Commission, and which contain a mass of most valuable and interesting information, I have been struck by the very faint light thrown upon the duodecimal principle, or how it would operate in our coinage. It was not only suggested, but most prominently placed before each individual witness, by the following question in Lord Overstone's comprehensive series, to which I give the answer of Sir J. F. W. Herschel, Bart.—

9. (1.) In an old but very remarkable treatise on Coin and Coinage

Answer. (1.) Vaughan is rather a fanciful writer, but he

(Vaughan, 1675) this passage occurs —
 "Of all the numbers, Twelve is the
 " most proper for Money, being
 " the most clear from fractions
 " and confusion of Account,
 " which ought not to be neglected,
 " by reason that of all other numbers it is most
 " visible, being divisible into
 " units as all numbers are; into
 " two parts as no odd number
 " is; into three parts as no even
 " number is but six, and the
 " numbers that consist of sixes;
 " into fourths, into which six is
 " not divisible; and into sixths."

is so far right in the abstract, that 12 would be in some respects (not in all) a preferable number for numerical reckoning to 10. If we had a duodecimal arithmetic, a Decimal Coinage would be a nuisance; but we have a decimal arithmetic, and we have not a duodecimal coinage.

Surely this reply of the learned baronet goes the length of suggesting, that if we had a duodecimal coinage, or if, by a slight alteration, our coinage could be made to assume a duodecimal character, we would obtain the ease in reckoning and calculation of which we are so anxiously in search. There are few such categorical replies to the question. The late Very Rev. and eminent Dr. Peacock, Dean of Ely, slurs it over thus, "A duodecimal arithmetic would have many recommendations, but who would propose it?" to which interrogatory, I would now humbly reply, "The man and the hour are both come;" for I feel, that I have now at least a chance of being listened to, while ten years ago, amid the almost daily issue of controversial papers and pamphlets on the question (which now mass up to nearly a thousand distinct publications), I had none. The intervening decade has seen almost all the surviving authors or supporters of schemes, conflicting with the prominent one, subside into uncompromising advocates of the present coinage, *without change*; but several have been removed by death, of whom the late Mr. Theodore Rathbone, the staunch advocate of the tenpence and penny units, which he maintained would make "*little change*," stuck by his flag to the last. Having been out of the field, I now assume the privilege of bringing up the rear, with a new and simple project, the fruit

of intermediate study and investigation, which will at the least prove an addition to the stock of public knowledge, on a still little understood question.

While the decimal power or factor is universally known to be 10, as the term implies, the duodecimal power or factor is 5; but this number seems generally to be regarded as only a half or imperfect decimal factor, while it is really the very reverse—the duodecimal is really a *double decimal* power, and as the greater, comprehends the less. In coinage, the decimal power is used as a divisor from a unit *downwards*, while the duodecimal can only be used as an *upward* multiplier of unity; but then the decimal power comes in alternately, as a multiplier or divisor, to shew at once which coins in the series are decimal, and which are duodecimal.

Ten years ago, when the question came to be generally agitated, I contributed to the controversy a paper upon the Portuguese monetary system as a model for our adoption; for which, although reported on adversely by the committee to whom it was referred, I received the special thanks of the Royal Scottish Society of Arts, in whose Transactions it was printed. I then proved—Sir John Bowring's observations to the contrary notwithstanding—that, with the exception of the decimal character of the one, and the non-decimal character of the other, the coinages of Portugal and Britain were absolutely identical in the divisions and values of their whole series of coins. I then pointed out that the decimal principle of the Portuguese coinage resided in the lowest step, which was one *below* our own, and suggested that the line of demarcation must be so thin—though I did not then see how to surmount it—that it was well worthy of being fully sifted by the superior mental powers engaged in the investigation. Shortly afterwards I went to Canada, where five of the intervening years have been passed, and whence I was forced to return to native air by much impaired health. Carrying with me my decimal coinage proclivities, I published a pamphlet against the “dollarizing” of the Canadian currency, pointing out what I considered a better and more natural way, and just as easily entered upon, in the British farthing or half-cent

minimum unit, and the high integer of the guinea of 1000 farthings. The change to dollars and cents was eventually consummated. It is to be observed, however, that the Canadian dollar is not the veritable coin impiously called “almighty”—which, whether it be gold or greenback, is playing havoc alike with North and South—but an imaginary dollar of 5s. currency; so that, being engaged in the wine trade, when I found the difficulty—indeed, the impossibility—of fixing an exact price for a bottle of wine at 8 dollars per dozen; I had only to say mentally, 5 times 8 are 40, “one bottle 3s. 4d.” when the sum to be handed over was 2s. 6d. British sterling silver, making 3s. 1½d. currency, and 5 coppers 2½d. In reference to transitional difficulties, and the danger of disturbing “the basis of the ideas of value,” referred to by the Chancellor of Exchequer as being “a very delicate matter,” I may mention, that though the ladies of Canada had been quite accustomed to, and familiar with the “dollar,” as every bank-bill bore “dollar” in one corner, and “five shillings” in the other, yet I found the female mind peculiarly sensitive in the matter of “cents”—the very mention of the obnoxious term in reckoning was sure to raise a storm, and to be met with, “Don't talk to me of your cents,” etc., etc. In Canada, however, I obtained valuable insight into decimal coinage principles.

Necessarily conforming to the change from £ s. d. to dollars and cents, in notation, I found that a purely decimal currency was not suited to human exigencies, or in accordance with human tendencies, and the impossibility of noting *correctly* the price of either one or two bottles of wine, at any number of dollars per dozen, was a daily source of disquiet and discomfort, to which I feel assured the British people would never submit. In fact, we practically shew our aversion to assume decimals, *at present*, for in the case of every article, which is now nominally sold wholesale, in a pure decimal *quantity*, that is per hundred—such as eggs, fish, and many other commodities—we find that, in every case, they are actually sold by what is called the “long hundred,” or 120, which is only a device to get out of the decimal into

the duodecimal, so that both the cost per dozen and the retail price per dozen, or any fraction of a dozen, may with ease be fixed and determined. I saw also, while across the Atlantic, in reference to decimal units, that, putting out of view the depreciated legal tender of Portugal, which raises the value of the milree in exchange, the Portuguese unit and the American dollar are identical in intrinsic value, though deduced by different processes. I may here notice another accident of currency of which Canada had the benefit. The imperial system of measures has never been adopted in America, where the rule is the *old* wine-measure of England, which is in relation to the imperial as 6 to 5. This difference or discrepancy would have involved a long calculation and redistribution of prices per gallon, on all invoices of liquids from Britain. But the Canadian pound was in exactly the same relation to the pound sterling—that is, £6 currency = £5 sterling—so that the one difference neutralized the other. I may here also remark that the introduction of the imperial gallon, 40 years ago, affords another instance of our getting away from the decimal into the duodecimal, inasmuch as it made 2 gallons equal to 12 quart bottles, or a dozen, while the previous ratio was 10—again much to the advantage of simplicity in calculation. From the concurrent circulation in Canada of an £ s. d. currency and a decimal currency, I saw that the difference in numerical value or position was one-fifth, or 20 per cent—a fifth, or 10d., added to the value of the *actual* dollar of 4s. 2d., making the dollar of 5s. So that we have this per-centage or difference to overcome, and not “only 4 per cent,” which the decimal theorists have all along proclaimed as “the slight difference” to be got over, before our currency and coins can be brought to a decimal value, in accordance at least with those of the rest of the world.

Reverting, then, to my early personal experience of the simple duodecimal system of Portugal, I find that our minister at Lisbon, in replying to Lord Overstone's questions in 1857, bears valuable testimony to its advantages, thus—“The convenience of the Portuguese system of money of account, in re-

cording payments and receipts, is generally acknowledged, as well by official, scientific, and commercial men, as by private individuals in their ordinary transactions; and this circumstance will, in some measure, account for the general absence of practical information concerning it; since it is commonly only when difficulties present themselves, that the ingenuity of practical and scientific men is excited in suggesting remedies for them. It will, therefore, perhaps be sufficient to point out one trifling difference between their money of account and that of other countries using the decimal system—namely the use of a single denomination, that of “reis,” instead of two, as “dollars and cents, francs and centimes.” With one denomination of account, however, I may now add that every coin has a distinctive name, in the lower range indicative of its value in vintems or pence, exactly as with us; and as the same system has existed in Portugal in all monetary time, we may safely assume that the duodecimal coinage of Portugal is the original type, and all other *pure* decimal coinages only modifications, or one of the “many inventions” which fallen man has “sought out.” Having thus cleared the ground by, I hope, a not too prolix preliminary explanation, I now proceed to make the application to our own circumstances. And, first, to get over the difference of 20 per cent. This, decimally, might be a hard, if not an impossible task, but duodecimally it is a simple and easy one. Keeping accounts decimally is only stating them in cumulative amounts of the lowest coin. I stated before that the decimal power or multiplier in the Portuguese coinage resided in the lowest step, which is from 1 to 5, and in all other respects it was similar to our own; therefore, to obtain the same effect, we have only to manipulate the root of *our* coinage—to take the 20 per cent off the farthing—which is done by making the farthing the fifth, instead of the fourth of a penny—and in a moment, our coinage, which it has been the fashion to call complicated, becomes the *ne plus ultra* of perfection and simplicity. By a sort of paradox, the lowering the value of a *fraction* increases the bulk or numerical expression of every

integer, but that is all. No other coin is either changed or withdrawn—no value is disturbed—no familiar name is affected—and, above all, no transition period is felt—while hardly a “permissive” bill is required from Parliament, as is now being attempted in reference to the introduction of the metrical system of weights and measures; and yet the coinage is decimal and doubly decimal, while the relative notation is decimal to the heart’s content of the most rabid decimalist. To all who do not work in or with the present farthing, in their books or accounts, this change in its value may be a matter of pure assumption or imagination, and they may at once adopt decimal notation in all their business or private transactions. Indeed, by means of a single extra column, a set of books might be kept in £ s. d. and decimals concurrently, the one balancing with and checking the other, and obviating the necessity of going *twice or oftener over the same addition*, as is generally done, and frequently by different heads and hands, before there can be any confidence in its correctness. For convenience, I have prepared tables of conversion, with the simple rule for the operation, and examples of notation and exchange.* It will be at once seen that each of our coins (with two exceptions) is now represented in farthings (in which the notation is to be carried on), by one of the headings or first line of our multiplication table, with one or more ciphers attached; and consequently the labour of the schoolroom and counting-room is greatly decreased, and compound arithmetic at will, banished from both. The superiority of 6 or 60 as a multiplier for the shilling over 48, and other coins in the same relation, is too obvious to require to be insisted on. It will also be seen, that the penny, instead of being sacrificed, is now as 5, the duodecimal multiplier, really the motor and mainspring of this simple system. Practically there is no fixed maximum unit, as it is called, under a pure decimal system, other than the natural unit of the mille, or “milree,” as it is termed, in Portuguese currency. But any unit may be evolved from the cumulative decimal, and kept out distinct in every money-

* Appendix, No. 1.

tary record, provided it is represented by an integer singly divisible. In Portugal they speak of 20 moidores, the coin or expression analogous to our pound, but in recording such a sum, they note it 96||000, or 96 milrees: they cannot record it in moidores, because the moidore is represented by 4||800, four mil eight, exactly the unworkable compound multiplier or divisor of our shilling, as 48 farthings. But with our pound represented by 12, as Vaughan said in 1675, “of all the numbers the most proper for money,” the keeping of the pound distinct as the *maximum* unit is the easiest matter, and simply depends upon the volition of the operating arithmetician. Say that we wish to express £2:2s., which in the aggregate decimal would be 2520; simply divide by 12, and we get £2.120 or £2:2s. I have given, as a contrasted specimen of the present and new notation, several amounts set down at random, and amounting to £255:13:8. Keeping out the pounds, as the unit, we find the addition of the pounds and decimal to be £247.10420; dividing 104 by 12, we get £8 to add, and .820 over, which is the decimal of 13s. 8d. By the same rule the unit of any foreign currency may be evolved from the aggregate decimal, which of the above sum is 306820. The American dollar at 4s. 2d. is 250 farthings, the fourth of one thousand; simply discard the cipher (because America has banished the mil from her notation), and multiply by 4, and inserting the decimal point betwixt the second and third figure from the right, we get 1227.28 (dollars and cents) as the equivalent of £255:13:8. But not only does this rule of conversion apply to large, or broken sums, but it applies to every individual coin, to the effect almost of establishing the Utopia of an international coinage. Supposing that the value in farthings is marked upon each of our coins, the stupidest Yankee may at once be “posted up” in their relative value, for he has only to multiply the figure by 4, discarding one cipher; for instance, the threepenny piece, 15, multiplied by 4, becomes 60, or six cents, the shilling, 24 cents, the sovereign, 4.80—four dollars eighty cents—the value of the sovereign in the States before the war, less 4 cents

added, for a slight difference in the mint price of gold, which made it 4.84. I have given the equivalent for the pound of 1200 farthings, in the currency of most countries of the world, from the Equator almost to the Pole;* and this change will at once do away with the perplexities and complications of the "chain rule," which the "pound and mil scheme," had it been perpetrated, would only have increased. Under it, the dollar at 4s. 2d. would have been 2 florins and the twelfth of a florin, but where would have been the twelfth of 100 mils without unworkable fractions?

But I have said that the duodecimal includes the decimal, and I proceed to prove it. It will be seen that the coinage is divided into three distinct divisions of four coins each. These are the places of the real or imaginary units of the thousand, or pure decimal range. We have the lowest unit in the farthing; and suppose we introduce the "dime" "cent" and "mille," you see that every coin is now decimally related to the decimal unit below it. By introducing the decimal point betwixt the 1 and the 5, the three-penny piece shews itself to be a dime and a half; the half-crown, a cent and a half; the sovereign $1.200 = 1 \text{ mille } 2 \text{ cents}$ —or 12 cents—or 120 dimes—or 1200 units or farthings. These units, or any of them, may or may not be in time represented by coins: the withdrawal of the three-penny piece, and the substitution of a bronze piece of 10 farthings, would be an advantage.

Solomon said, ages ago, "Is there anything of which it may be said, See, this is new? It hath been already of old time which was before us." Accordingly, it is interesting to us to know, that the penny of 5 farthings is the ancient Scots shilling, and the cent of 100 farthings the ancient pound Scots. The old Scots money was duodecimal, 1200 farthings, the expression I now propose for the pound sterling, being £12 Scots. Pity it was (perhaps blindly) assimilated by the Act of Union in 1707. But to secure the benefit of this simple system of duodecimal reckoning and decimal notation to the great bulk of the community, what may at once be done by

* Appendix, No. 2.

mere assumption, by those who never allow the present farthing to enter their books, would require to be done by public law for those who have to deal largely in farthings in almost every item of accounting. To this necessity, bakers are principally as a class exposed. We had it in evidence before the Parliamentary Committee of 1853, that there is a vast traffic in farthings among the poor throughout the country; and in reference to the *then* proposed change of 4 per cent in the value of the farthing, the Committee report—"Your Committee have endeavoured to ascertain the probable feeling of the public, especially of the working classes, in reference to the proposed change; first, by examining witnesses who may be supposed to be well acquainted with their feelings; and, secondly, by means of the analogy to be drawn from previous changes of a somewhat similar character. As respects the first point, several witnesses who have very extensive dealings with the poor, and some of whom are accustomed to take as many as 1000 farthings per week over the counter, have expressed their opinion, that if the farthing were altered from its present value (the $\frac{1}{20}$ th part of the pound sterling) to the $\frac{1}{24}$ th part of the pound, in accordance with the decimal subdivision, no prejudice would be raised against this slight decrease of four per cent in the value of the farthing, provided they were made to understand that they could, on the other hand, get 25 of the new coin for sixpence, where they now get 24. All the traders examined also stated, as the result of their experience, that competition invariably causes the quantities of the articles sold to adjust themselves without difficulty to the value of the money received for them." The proposal of the pound and mil advocates, to alter the value of "the poor man's penny," brought out against it a host of opposition; and the above quotation from the report of the Committee sets out in a strong light the cool assumption on which the theorists proceeded, with the "tyranny of capital" in the background. Methinks, had their scheme carried, I hear one of these farthing millionaire witnesses endeavouring "to make a poor man understand" the beauties and advantages of the change. The starving is

of course insinuating, that his *farthing's worth* looks somewhat less than usual; "Of course, my good man," says the capitalist, "you know the farthing has been reduced in value by four per cent, and the article is less in the same proportion." Here the poor man probably begins to mutter "curses, not loud but deep," against the "tyranny of the Government," and "the oppression of the poor." "No oppression at all, I assure you," says the capitalist; "you will now get 25 farthings for your sixpence, where before you only got 24." Imagine the stricken look of the poor man as he whines out, "*But how if I never have a sixpence?*" But this greater change of 20 per cent in the *farthing alone*, will perpetrate no such injustice, either on the poor, or on any individual; while it will subvert the disinclination of the farthing capitalists to a lower coin, and the breaking of the "integrity of trade."

It may be taken for granted, that wherever there is so large a traffic of farthing purchasers, as has been shewn in evidence to exist, in the stratum of poverty, not only to that stratum, but to a lower still, would the introduction of a lower coin than the farthing be a boon inestimable. Now there has been lying for years upon years at the Mint, a large coinage of *half-farthings*, which has *never been inquired for in this country*, although largely in demand for Ceylon and other colonies; while a smaller coin still, called an *obolus*—the tenth of a penny—has been sent in millions to the Ionian Islands. The half-farthing not having been taken out for this country, it has been simply assumed by the authorities at the Mint, and stated so in evidence, that "it is not required." There never was a greater fallacy or delusion. Had the introduction of the half-farthing into circulation *depended on the poor*, it would have been in general circulation long long ago; but it is exactly the same here as in the "25 farthings for the sixpence," which the poor man never has to change. Could the poor man take his single hard-earned penny to the Mint, and exchange it against eight half-farthings, who can doubt that it would have been often done? But who does not also know, that he

would probably be turned from the door with jeers by the clerks, and told, "the next time he came, to *bring a sovereign or two*, as they only did business there by wholesale." It is evident that the farthing capitalist trader will do nothing voluntarily to break his trade into half-farthings, and it is he alone who can get the lower coinage out in the requisite amount. But this change in the farthing—which I scarcely permit myself to doubt, our gracious Queen will be advised to effect by royal proclamation—will bring to bear upon these same traders, the powerful lever of self-interest, to the benefit of her poorest subjects, for whom her Majesty is ever solicitous. It is evident that, under a change in the farthing coin of 20 per cent, all holders of that coin in any quantity would be losers of 5s. per mille; and unless some means were taken to compensate them, they might reasonably complain of injustice; but as the farthings would require to be marked with their decimal value, her Majesty, in proclaiming the lowering of the value, has only to add, that, for a certain period, farthings sent in to the mint in sums of 200, will at once be exchanged for 500 *half-farthings*, or "mites," as the coin may be appropriately and scripturally called (the widow "threw in two mites, which make a farthing"); and thus will all injustice, or even appearance of it, be avoided, and this coin, for the want of which "the faces of the poor" are even now "ground," be, of its own force, introduced into general traffic, and the poor man, who to-day can only make four distinct purchases out of his penny, will be able, after the change, to make five, or if he so require, *ten*; while the poorest of the poor, living from hand to mouth, will be able to make five purchases out of a halfpenny, where he can now only make two. But it will not be the poor alone who will be benefited by the introduction of the half-farthing or mite into circulation, but the entire community. In respect of an article of such universal consumpt as bread, which "is the staff of life," it is not possible, with the present lowest descent of our coinage, to meet, in the price of the quarter loaf—more especially of the half loaf—both of which must be of statutory weight, the

weekly fluctuations of the markets for breadstuffs. The price of the loaf is determined by the market price of the sack of flour of 280 lbs., and it requires the change of 4s. per sack to affect the price of the loaf by a halfpenny, either upwards or downwards, because there is no other alternative price than pence and a half for the whole loaf; but with the *tenth of a penny* introduced into the current coinage, there will be four alternative prices for the loaf below the penny, instead of one, as 2, 4, 6, or 8-10ths. Thus will every single shilling of rise or fall in the price of the sack of flour be at once met, weekly, as they may arise. That this is not a small matter for the country may be judged from the consideration, that if we assume the population of the United Kingdom to be thirty millions, a saving apparently so unimportant as the fifth of a penny per week by each individual in the price of the bread consumed, would amount at the end of a year to one hundred and thirty thousand pounds. The half-farthing or mite would not probably turn up frequently in the notation of general trade, but in bakers' bookkeeping and accounts it frequently would; and I may therefore indicate how it would be easily noted, without anything like the trouble which our present fractions of the penny require. The notation being in farthings, and the fraction in every case the half of the integer, it would not be necessary to represent it by any figure, but by a simple point or line, thus— $35\frac{1}{2}$ 31 $\frac{1}{2}$ ($7\frac{1}{2}$ d. 35 $\frac{1}{2}$), ($6\frac{1}{2}$ d. 31 $\frac{1}{2}$), ($6\frac{1}{2}$ d. 33); and in adding up the longest column, the *points* would only have to be counted, halved, and then the sum carried to the first column of figures. Here will be observed what will be a vast ease and simplification, both in the reckoning and notation of the smaller tradesman. The half-farthing will rarely come up in notation, but the quotation of prices under the shilling, being in pence and *tenths*, while the notation is duodecimally in *fifths*, the notation, whether for simple record or multiplication, is always the half of the decimal price. Thus 1 lb at $7\frac{1}{5}$ d. or 7·6 would be recorded as 38 farthings, which again, as $3\frac{1}{5}$ is the price of half a lb., recorded as 19 farthings, the half of which again for $\frac{1}{4}$ lb. would be 9 $\frac{1}{2}$.

The notation of bakers' accounts is almost mechanical. My recollections do not quite go back half a century; still I perfectly recollect when a family baker's bookkeeping consisted of a slip of wood, on which the loaves and half-loaves supplied were recorded by a corresponding notch with a knife, by the deliverer, and the total charged in a slump at the end of a week or month, under the comprehensive entry of "Week's bread," or "Month's bread." They did not even put, as some professional men now do, "particulars if requested;" for I suppose, after recording the result, they at once proceeded, as our proverb hath it, to "clean the nick stick" for a new recording operation. I have given a specimen of a baker's notation as it is at present, and as it would be under my proposed system.*

While the change in the farthing, then, would operate so beneficially in regard to the poor, it cannot entail even inconvenience in any department, as would have so largely resulted from the change in the *penny* and *farthing*, under the pound and mil scheme. We know that there are some taxes imposed at a farthing in the pound, some railway rates at a farthing per ton, but this is the farthing as the fourth of a penny, and not as a coin, requiring to be paid; and the penny, not being altered in value, the fourth of a penny, as a charge, is no more affected, than is the sixteenth, or twenty-fourth, or thirty-second, which there is no coin to represent, and which merchants may still continue as now, should they not see the advantage of changing to the decimal fractions, of the tenth of a penny, or even the tenth of a farthing, if they require to go so low. But this change in the farthing, which perfectly introduces the decimal principle into the coinage and notation, still renders decimal reckoning *compulsory upon no one*, so that there can be no doubt here of "the ground under foot not being secure." Even if the people should prove apathetic, and slow to adopt the change, it would still be compensated by the complete revolution which it would effect in our complicated arithmetic. Every one is familiar with the roundabout process required in

* Appendix, No. 4.

every "rule of three" or proportion question, of reducing to farthings, by successive multiplications by 20, 12, and 4, and the converse process at the end, of division by 4, 12, and 20, to bring the amount to £ s. d., which greatly increase the liability to error. Even these processes are not interfered with, except in the substitution of 5 for 4, to all who may still choose to pursue them; but they are superseded by a choice of processes incomparably simpler, shorter, and easier. Each denomination of account is simply multiplied by its own integer; pence by 5, adding in any farthings there may be, shillings by 6, and pounds by 12, carrying the ten as in simple multiplication; or any sum of £ s. d. may be multiplied by 12, setting the shillings above the line and continuing the multiplication into pounds—then either add a cipher to the shillings and take the half, or multiply the shillings by 5, attaching the product to the amount of pounds, adding thereto any farthings if present, and the decimal is the result. Take the following example:—What is the price of 1 lb. at

$$\begin{array}{r} \times 12 \quad 6 \quad 5 \\ \hline 8109898 \end{array}$$

Divide by 112 lbs. = 1 cwt. 713737.2 over.
 21962.3 over.

Answer $981\frac{9}{12}$ farthings = 16s. 4½d.

ascertained by division of the decimal by 6 and 5 continuously. Now this is an example chosen by Professor de Morgan himself, to compare the work of the present system and the pound and mil scheme, and is specially referred to in Lord Overstone's report. This process is both simpler and easier than the one the Professor gives, which requires "the head rule for conversion into decimals" (that is, into florins, cents, and mils) to be first learned, and which he admits can only be done by "those who now use decimals." As compared with the present system, "there is no byework, not a moment's strain upon a head which contains the common multiplication table—work incomparably more easy, and risk of error very much lessened."

It was claimed for the pound and mil scheme that the coins in which to discharge any amount would be at once indicated; for instance, that 5.876 would at once indicate five pounds, eight florins, seven cents, six mils. Much more stress has been laid upon this than it is at all entitled to in practice; but it is evident that the same advantage, such as it may be considered, would at once be secured under this suggested system, by the introduction of coins of 2d. and 20d., and not even requiring the withdrawal of the coins of 3d. and 24d. already in circulation.

But the comparative benefits which will result to our arithmetic from the one scheme and the other, will be best judged of if we extract from any school-book the table for "Practice,"* of the aliquot parts of the pound and of the shilling, and set against these on either side the representation in decimal farthings and in mils of the 17 aliquot parts; 16 are represented in this scheme by exact decimals or duodecimals—viz., 13 by multiples of 10, three by 5 or multiples of 5, and only one by an odd number and fraction, $7\frac{1}{2}$; whilst under the pound and mil scheme only four are represented by multiples of 10, two by multiples of 5, while all the rest are not only odd numbers, but every one of them either loses or takes in fractions of a mil, and therefore there is no wonder that this scheme—which was the only one that acquired a *locus standi*—was pronounced *impracticable*. Now I affirm, that if my system be in the eyes of "an uncompromising advocate of a decimal coinage," a "quinto-duodecimo-vicesimo *hotch-potch*" (the Professor will allow me to correct his spelling, it being a Scotch dish), it is incomparably more easy than his, at once commends itself to the *meanest* comprehension, and is once and for all for *everybody*, whether they now use decimals or not—the world at large at once learning decimals from the familiar "concrete coins" they have been accustomed to see and handle, and not requiring to "mend their coins," when once the farthing root alone is pared down to the decimal standard.

The aggregate expression of money under pounds, would

* Appendix, No. 5.

be in farthings, but by the introduction of a coin of 20d., or 100 farthings, the twelfth of a pound, or by the mere assumption of the term "cent," our money would be divided into three denominations, as at present, but without fractions, and the three-ruled columns of our books would exactly suit, while it would afford the greatest convenience for enunciation in comparing, or "calling over;" as £4.324, Four pounds, three cents, twenty-four farthings; £5.1125, "Five, eleven, twenty-five," etc. By the introduction of the half farthing, again, the former protection to the landed interest and wheat growers, afforded by the sliding scale, which was so long a bone of contention, might now be transferred to the public, and the *price*, as well as the weight of the loaf, be statutorily fixed, according to a "sliding scale," depending on the weekly price of wheat or flour, which the telegraph practically equalises over the whole country. I believe the respectable bakers would hail such a provision as a boon, ensuring, as it would, uniformity of practice, and doing away with the necessity of "regulation of the trade," by association of members and a code of rules.

In the close of their Report, the Royal Commissioners and the veteran and experienced Lord Overstone, in his very able "Draft Report," advise the Queen's most Excellent Majesty, that, "after a thorough and comprehensive examination, after every project has been completely sifted, it may be hoped that the controversy which has now been so long pending will be finally set at rest by a generally accepted decision, either in favour of our present system, or of some one or other of the modifications which have been suggested."

I now claim to have set the controversy at rest, by a new project which was not sifted by the Royal Commissioners, not being before them, and as that tribunal is now closed, I have brought it before the Royal Society of Edinburgh, as, in my judgment, the next best accessible, having for one of its vice-presidents a gentleman not only eminent in arithmetical science generally, but eminent on this very question of coinage; in the discussion of which he has borne a distinguished part, his views being specially and largely

referred to, in the final report of the Commissioners. I claim that my discovery, if I may call it such, is a great advance on the science of five years ago. The late Mr. Rathbone, whose eminence as a decimalizer, if not a decimalist, is well known, has placed upon record his opinion or belief, after intense study of the question, that, "In no way—on no terms ingenuity can devise—is it possible to retain in our accounts, or in our financial language of whatever kind, the absolutely stipulated old English pound sterling as well as the still more valuable old English penny;" and this opinion the Royal Commissioners endorse *in ipsissimis verbis*. "It is impossible to introduce decimals, without sacrificing either the pound or the penny." Yet here is the "*impossibility*" overcome to demonstration, by a scheme (the ingenuity of which I leave to the opinion of others), not only fulfilling every requisite that seems ever to have been expected from a decimalization of the coinage, but more, and offering besides, great collateral and material advantages, with such an *absolute minimum of change*, that one half of the nation will have made it mentally in practice, before the other half has even time to think of it, or ask the executive for the tangible practical application. The question of necessary change, then, being reduced to the narrowest basis, it now comes to be a consideration, whether after fifty years discussion of the question, and a vast expenditure of money, we shall longer remain as we are, or await "further developments." With the lesson I am now fortuitously permitted to afford, I am not disposed to dogmatise upon the absolute finality of discovery, in such a wide field as arithmetical science; but I would humbly submit, that it is for us to take action in accordance with the feelings and predilections of our own times, *haud nimum credens postero*. In so doing, in reference to the present proposition, we do not hamper, but rather simplify the action of succeeding generations, for if it should happen, even at the advent of Macaulay's New Zealander, that an opinion should prevail, that the debatable unit, the pound of 20s. is an unseemly excrescence on the symmetry of an otherwise harmonious decimal system,

the currency reformers of those remote times will only require to reduce its expression by one-sixth, or to 16s. 8d., and lop off the 200 farthings from the thousand. This step need not either imply or foreshadow the deposition of the sovereign from being the *standard of value*. The monetary expression throughout, either upwards or downwards, will then be by tens, without the introduction of a single new coin, or the withdrawal or change in any respect of those existing; while Britain will still have a unit much higher than any other nation of the world: the intermediate coins, or any combination of them, remaining duodecimal and divisible by the "*dozen*," an advantage which no decimalized or decimalizing nation, from a *low* unit, can achieve; whilst the *dozen* is an institution so thoroughly engrained into all our notions, that it will last to the remotest time, in spite of the *tennish* tendencies (the adjective is not of my coining) which would subvert it.

I now bring forward this proposition with some confidence, as affording, so far as I can see, amid great diversity of opinion, and diffidence of untried, and until now, untryable results, the only hope of ever introducing the benefits of decimal reckoning into the multifarious concerns and interests of this great commercial country. The effecting the change here contended for, would simply be placing the coinage, without disturbance, in a position of being decimally wrought, leaving the reckoning, which is a process of the mind, to make its own way, by force of its inherent merits, without the slightest arbitrary dictation by or to any one. Had Government only known to have effected this simple change in 1847, instead of introducing the florin, which has not brought us a bit nearer to a decimal system, what an amount of labour, and "worry," and expense, might have been saved to the country! Even now, the change will be felt almost as a "ticket-of-leave" from penal servitude. I do not think that this change, looking at it merely as an experimental step, would be of doubtful result. Although decimals are governed by laws as unalterable as those of the Medes and Persians, I feel persuaded that this system, which is a felici-

tous blend or admixture of the decimal and duodecimal, would be found, upon close inspection, sufficiently expansive to meet the requirements of all, with the exception perhaps of those pure decimal philosophers, who, by an overweening veneration for what they are pleased to term "principles," instead of acquiring "a mastery over figures," would allow them to become the masters instead of the servants of those who use them. Under this system, the actuary and statist may easily pursue his calculations into the realms of infinity. The great intermediate class, whose businesses require the reckoning and record of minute fractions, would be immensely eased in this respect. A comparison of the notations will shew that on the average there are not more figures required in the one than in the other, but those of larger concerns and loftier ideas, who are accustomed "never to mind the coppers," and now exclude from their books everything below a penny, have only to elevate their ideas and their minimum of disregard a shade higher, and record in figures nothing under 10 farthings, adopting the algebraical sign $\frac{1}{10}$ for the odd 5 farthings or penny as it occurs, and they may there terminate their decimal, and reduce the system by one place, annihilating a whole column and the labour of addition. Despite, however, of all theoretical prejudice or preference for one system of decimals over another, or for the present system over any, the manifest improvement to our laborious arithmetic, which this simple change would immediately effect, is beyond all question.

JAMES ALEXANDER.

EDINBURGH, 9 NORTH ST. DAVID STREET,
March 1864.

APPENDIX, No. I.

NEW MONEY TABLE.

2 Mites, 1 Farthing; 5 Farthings (instead of 4), One Penny; 12 Pence, 60 Farthings (instead of 48), One Shilling; 20 Shillings, 240 Pence, 290 Farthings (instead of 240), One Pound.

TABLE of Monetary Decimals from One Farthing, $\frac{1}{4}$ th of a Penny, to One Pound Sterling of 1200 Farthings.

TABLE of Monetary Decimals from One Penny, to One Pound Sterling of 1200 Farthings.												
	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d.	11d.	
0001	0010	0015	0020	0025	0030	0035	0040	0045	0050	0055	0060	£ 0 0 1
0002	0020	0030	0040	0050	0060	0070	0080	0090	0100	0110	0120	£ 0 0 2
0003	0030	0045	0060	0075	0090	0105	0120	0135	0150	0165	0180	£ 0 0 3
0004	0040	0060	0080	0100	0120	0140	0160	0180	0200	0220	0240	£ 0 0 4
0005	0050	0075	0100	0125	0150	0175	0200	0225	0250	0275	0300	£ 0 0 5
0006	0060	0090	0120	0150	0180	0210	0240	0270	0300	0330	0360	£ 0 0 6
0007	0070	0105	0140	0175	0210	0245	0280	0315	0350	0385	0420	£ 0 0 7
0008	0080	0120	0160	0200	0240	0280	0320	0360	0400	0440	0480	£ 0 0 8
0009	0090	0135	0180	0225	0270	0315	0360	0405	0450	0495	0540	£ 0 0 9
0010	0100	0150	0200	0250	0300	0350	0400	0450	0500	0550	0600	£ 0 0 10
0011	0110	0165	0215	0265	0315	0365	0415	0465	0515	0565	0615	£ 0 0 11
0012	0120	0180	0230	0280	0330	0380	0430	0480	0530	0580	0630	£ 0 0 12
0013	0130	0195	0245	0295	0345	0395	0445	0495	0545	0595	0645	£ 0 0 13
0014	0140	0210	0260	0310	0360	0410	0460	0510	0560	0610	0660	£ 0 0 14
0015	0150	0225	0275	0325	0375	0425	0475	0525	0575	0625	0675	£ 0 0 15
0016	0160	0240	0290	0340	0390	0440	0490	0540	0590	0640	0690	£ 0 0 16
0017	0170	0255	0305	0355	0405	0455	0505	0555	0605	0655	0705	£ 0 0 17
0018	0180	0270	0320	0370	0420	0470	0520	0570	0620	0670	0720	£ 0 0 18
0019	0190	0285	0335	0385	0435	0485	0535	0585	0635	0685	0735	£ 0 0 19
0020	0200	0300	0350	0400	0450	0500	0550	0600	0650	0700	0750	£ 0 0 20
0021	0210	0315	0365	0415	0465	0515	0565	0615	0665	0715	0765	£ 0 0 21
0022	0220	0330	0380	0430	0480	0530	0580	0630	0680	0730	0780	£ 0 0 22
0023	0230	0345	0395	0445	0495	0545	0595	0645	0695	0745	0795	£ 0 0 23
0024	0240	0360	0410	0460	0510	0560	0610	0660	0710	0760	0810	£ 0 0 24
0025	0250	0375	0425	0475	0525	0575	0625	0675	0725	0775	0825	£ 0 0 25
0026	0260	0390	0440	0490	0540	0590	0640	0690	0740	0790	0840	£ 0 0 26
0027	0270	0405	0455	0505	0555	0605	0655	0705	0755	0805	0855	£ 0 0 27
0028	0280	0420	0470	0520	0570	0620	0670	0720	0770	0820	0870	£ 0 0 28
0029	0290	0435	0485	0535	0585	0635	0685	0735	0785	0835	0885	£ 0 0 29
0030	0300	0450	0500	0550	0600	0650	0700	0750	0800	0850	0900	£ 0 0 30
0031	0310	0465	0515	0565	0615	0665	0715	0765	0815	0865	0915	£ 0 0 31
0032	0320	0480	0530	0580	0630	0680	0730	0780	0830	0880	0930	£ 0 0 32
0033	0330	0495	0545	0595	0645	0695	0745	0795	0845	0895	0945	£ 0 0 33
0034	0340	0510	0560	0610	0660	0710	0760	0810	0860	0910	0960	£ 0 0 34
0035	0350	0525	0575	0625	0675	0725	0775	0825	0875	0925	0975	£ 0 0 35
0036	0360	0540	0590	0640	0690	0740	0790	0840	0890	0940	0990	£ 0 0 36
0037	0370	0555	0605	0655	0705	0755	0805	0855	0905	0955	1005	£ 0 0 37
0038	0380	0570	0620	0670	0720	0770	0820	0870	0920	0970	1020	£ 0 0 38
0039	0390	0585	0635	0685	0735	0785	0835	0885	0935	0985	1035	£ 0 0 39
0040	0400	0600	0650	0700	0750	0800	0850	0900	0950	1000	1050	£ 0 0 40
0041	0410	0615	0665	0715	0765	0815	0865	0915	0965	1015	1065	£ 0 0 41
0042	0420	0630	0680	0730	0780	0830	0880	0930	0980	1030	1080	£ 0 0 42
0043	0430	0645	0695	0745	0795	0845	0895	0945	0995	1045	1095	£ 0 0 43
0044	0440	0660	0710	0760	0810	0860	0910	0960	1010	1060	1110	£ 0 0 44
0045	0450	0675	0725	0775	0825	0875	0925	0975	1025	1075	1125	£ 0 0 45
0046	0460	0690	0740	0790	0840	0890	0940	0990	1040	1090	1140	£ 0 0 46
0047	0470	0705	0755	0805	0855	0905	0955	1005	1055	1105	1155	£ 0 0 47
0048	0480	0720	0770	0820	0870	0920	0970	1020	1070	1120	1170	£ 0 0 48
0049	0490	0735	0785	0835	0885	0935	0985	1035	1085	1135	1185	£ 0 0 49
0050	0500	0750	0800	0850	0900	0950	1000	1050	1100	1150	1200	£ 0 0 50
0051	0510	0765	0815	0865	0915	0965	1015	1065	1115	1165	1215	£ 0 0 51
0052	0520	0780	0830	0880	0930	0980	1030	1080	1130	1180	1230	£ 0 0 52
0053	0530	0795	0845	0895	0945	0995	1045	1095	1145	1195	1245	£ 0 0 53
0054	0540	0810	0860	0910	0960	1010	1060	1110	1160	1210	1260	£ 0 0 54
0055	0550	0825	0875	0925	0975	1025	1075	1125	1175	1225	1275	£ 0 0 55
0056	0560	0840	0890	0940	0990	1040	1090	1140	1190	1240	1290	£ 0 0 56
0057	0570	0855	0905	0955	1005	1055	1105	1155	1205	1255	1305	£ 0 0 57
0058	0580	0870	0920	0970	1020	1070	1120	1170	1220	1270	1320	£ 0 0 58
0059	0590	0885	0935	0985	1035	1085	1135	1185	1235	1285	1335	£ 0 0 59
0060	0600	0900	0950	1000	1050	1100	1150	1200	1250	1300	1350	£ 0 0 60
0061	0610	0915	0965	1015	1065	1115	1165	1215	1265	1315	1365	£ 0 0 61
0062	0620	0930	0980	1030	1080	1130	1180	1230	1280	1330	1380	£ 0 0 62
0063	0630	0945	0995	1045	1095	1145	1195	1245	1295	1345	1395	£ 0 0 63
0064	0640	0960	1010	1060	1110	1160	1210	1260	1310	1360	1410	£ 0 0 64
0065	0650	0975	1025	1075	1125	1175	1225	1275	1325	1375	1425	£ 0 0 65
0066	0660	0990	1040	1090	1140	1190	1240	1290	1340	1390	1440	£ 0 0 66
0067	0670	1005	1055	1105	1155	1205	1255	1305	1355	1405	1455	£ 0 0 67
0068	0680	1020	1070	1120	1170	1220	1270	1320	1370	1420	1470	£ 0 0 68
0069	0690	1035	1085	1135	1185	1235	1285	1335	1385	1435	1485	£ 0 0 69
0070	0700	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	£ 0 0 70
0071	0710	1065	1115	1165	1215	1265	1315	1365	1415	1465	1515	£ 0 0 71
0072	0720	1080	1130	1180	1230	1280	1330	1380	1430	1480	1530	£ 0 0 72
0073	0730	1095	1145	1195	1245	1295	1345	1395	1445	1495	1545	£ 0 0 73
0074	0740	1110	1160	1210	1260	1310	1360	1410	1460	1510	1560	£ 0 0 74
0075	0750	1125	1175	1225	1275	1325	1375	1425	1475	1525	1575	£ 0 0 75
0076	0760	1140	1190	1240	1290	1340	1390	1440	1490	1540	1590	£ 0 0 76
0077	0770	1155	1205	1255	1305	1355	1405	1455	1505	1555	1605	£ 0 0 77
0078	0780	1170	1220	1270	1320	1370	1420	1470	1520	1570	1620	£ 0 0 78
0079	0790	1185	1235	1285	1335	1385	1435	1485	1535	1585	1635	£ 0 0 79
0080	0800	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	£ 0 0 80
0081	0810	1215	1265	1315	1365	1415	1465	1515	1565	1615	1665	£ 0 0 81
0082	0820	1230	1280	1330	1380	1430	1480	1530	1580	1630	1680	£ 0 0 82
0083	0830	1245	1295	1345	1395	1445	1495	1545	1595	1645	1695	£ 0 0 83
0084	0840	1260	1310	1360	1410	1460	1510	1560	1610	1660	1710	£ 0 0 84
0085	0850	1275	1325	1375	1425	1475	1525	1575	1625	1675	1725	£ 0 0 85
0086	0860	1290	1340	1390	1440	1490	1540	1590	1640	1690	1740	£ 0 0 86
0087	0870	1305	1355	1405	1455	1505	1555	1605	1655	1705	1755	£ 0 0 87
0088	0880	1320	1370	1420	1470	1520	1570	1620	1670	1720	1770	£ 0 0 88
0089	0890	1335	1385	1435	1485	1535	1585	1635	1685	1735	1785	£ 0 0 89
0090	0900	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	£ 0 0 90
0091	0910	1365	1415	1465	1515	1565	1615	1665	1715	1765	1815	£ 0 0 91
0092	0920	1380	1430	1480	1530	1580	1630	1680	1730	1780	1830	£ 0 0 92
0093	0930	1395	1445	1495	1545	1595	1645	1695	1745	1795	1845	£ 0 0 93
0094	0940	1410	1460	1510	1560	1610	1660	1710	1760	1810	1860	£ 0 0 94
0095	0950	1425	1475	1525	1575	1625	1675	1725	1775	1825	1875	£ 0 0 95
0096	0960	1440	1490	1540	1590	1640	1690	1740	1790	1840	1890	£ 0 0 96
0097	0970	1455	1505	1555	1605	1655	1705	1755				

APPENDIX, No. 3.

Equivalents for the pound sterling of 1200 farthings at intrinsic par in the lowest coins of the following countries, with the values of their ruling integers in farthings.

America	480 cents	250 farthings	= 1 dollar.
Austria	2400 pennings	120	" = 1 florin.
Belgium	2500 centimes	48	" = 1 franc.
China	3000 cash	400	" = 1 tacl.
Denmark	888 schillings	280	" = 1 specie dollar.
Egypt	3840 paras	12½	" = 1 piastre.
France	2500 centimes	48	" = 1 franc.
Gibraltar	920 quartos	250	" = 1 hard dollar.
Greece	2800 drachmi	43	" = 1 drachma.
Hamburgh	2592 pfennings	88	" = 1 marc banco.
Holland	1200 cents	100	" = 1 florin.
India	1920 pice	120	" = 1 rupee
Italy	2500 centesimi	40	" = 1 lira nuova.
Malta	1200 scudi	100	" = 1 scudo.
Naples	600 grani	200	" = 1 ducat.
Portugal	4800 reis	250	" = 1 milree.
Prussia	2484 pfennings	173	" = 1 thaler.
Russia	640 copecks	187½	" = 1 silver rouble.
Sicily	1200 grani	600	" = 1 oncia
Spain	3264 maravedis	250	" = 1 dollar.
Sweden	576 schillings	100	" = 1 rix dollar.

THE PROCESS OF CONVERSION AND RECONVERSION

is eminently simple. To convert £ s. d. to decimal farthings, each denomination is simply multiplied by its own integer, and to reconvert, the decimal is divided continuously by 12, 6, and 5. In the following example the multipliers and divisors are "set down," but in practice they would be "in the mind's eye" only.

$$\begin{array}{r}
 £255 : 13 : 8 \\
 \times 12 \quad 6 \quad 5 \\
 \hline
 123060820 \\
 \hline
 £255 : 13 : 8
 \end{array}$$

APPENDIX, No. 4.

A BAKER'S ACCOUNTING OR PASS-BOOK.

				<i>As it is.</i>		<i>As it will be.</i>	
Dec.	1.	To 1 loaf.	at 7d.	£0	0	7	at 7d. or 35 farthings
3.	"	1½ loaves		0	0	10½	35
5.	"	2½ loaves		0	1	6½	52½
7.	"	3½ loaves		0	1	6	59
9.	"	4½ loaves		0	0	6½	66½
11.	"	5½ loaves		0	0	9½	74
12.	"	6 loaves		0	1	4½	81
13.	"	6½ loaves		0	1	4	88
14.	"	7 loaves		0	1	4	95
15.	"	7½ loaves		0	1	4½	102½
16.	"	8 loaves		0	1	4	110
17.	"	8½ loaves		0	0	3½	117½
18.	"	9 loaves		0	1	6	125
19.	"	9½ loaves		0	1	6	132½
20.	"	10 loaves		0	1	6	140
21.	"	10½ loaves		0	1	6½	147½
22.	"	11 loaves		0	1	6	155
23.	"	11½ loaves		0	1	6½	162½
24.	"	12 loaves		0	1	6	170
25.	"	12½ loaves		0	1	6½	177½
26.	"	13 loaves		0	1	6	185
27.	"	13½ loaves		0	0	6½	192½
28.	"	14 loaves		0	0	6	200
29.	"	14½ loaves		0	0	6½	207½
30.	"	15 loaves		0	1	4½	215
31.	"	15½ loaves		0	1	4	222½
31.	"	3 cakes shortbread	at 1s.	£1	3	6½	230
							Farthings 1414-
							51 process figures.
							£1 3 6½

This contrasted specimen of notation shows strikingly in favour of the Decimal System; in the £ s. d. 72 process figures are written, many of which are superfluous, and there are only 61 figures in the column—the mechanical operation reduced by a third, and the difference of mental work not to be estimated.

APPENDIX, No. 5.

PRACTICE.

Aliquot Parts of the Pound and Shilling as they would be in
Decimal Farthings and Mils.

Farthings exactly.	Florins, cents, and mils.
600, or 10s., a half . . .	500 mils
400, or 6s. 8d., a third . . .	333, exactly $333\frac{8}{24}$
300, or 5s., a fourth . . .	250
240, or 4s., a fifth . . .	200
200, or 3s. 4d., a sixth . . .	167, exactly $166\frac{1}{2}\frac{1}{4}$
150, or 2s. 6d., an eighth . . .	125
120, or 2s., a tenth . . .	100
100, or 1s. 8d., a twentieth . . .	83, exactly $83\frac{8}{24}$
80, or 1s. 4d., a fifteenth . . .	67 „ $66\frac{1}{2}\frac{1}{4}$
75, or 1s. 3d., a sixteenth . . .	63 „ $62\frac{1}{2}\frac{1}{4}$
60, or 1s., a twentieth . . .	50
Of a shilling	
30, or 6d., a half . . .	25
20, or 4d., a third . . .	17, exactly $16\frac{1}{2}\frac{1}{4}$
15, or 3d., a fourth . . .	13 „ $12\frac{1}{2}\frac{1}{4}$
10, or 2d., a sixth . . .	8 „ $8\frac{1}{2}\frac{1}{4}$
$7\frac{1}{2}$, or $1\frac{1}{2}$ d., an eighth . . .	6 „ $6\frac{1}{2}\frac{1}{4}$
5, or 1d., a twelfth . . .	4 „ $4\frac{1}{2}\frac{1}{4}$

**END OF
TITLE**